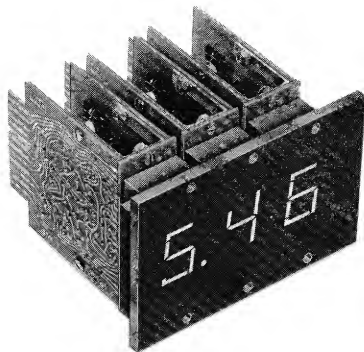




**4 REASONS
IT'S EASY
TO USE NQ
DIGITAL
READOUTS**

LOW INPUT LEVELS — Operates directly from integrated as well as conventional logic circuits.

4 LINE BCD INPUTS — Reduces wiring costs.

4 DIODES IS THE ONLY POWER SUPPLY REQUIRED —
Unfiltered, unregulated, full-wave rectified line voltage operates both display and decoder-drivers.

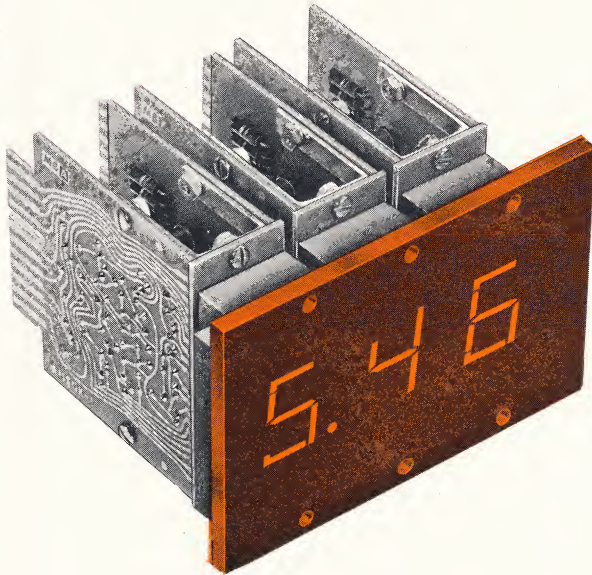
\$44 PER DIGIT — For complete display and BCD decoder-driver in quantities of 25 or more.

Send for series NQ data sheets.

MB Associates

P.O. Box 4994
Phila., Pa. 19119

SERIES NQ **DIGITAL DISPLAY and FOUR LINE DECODER-DRIVER**



Requires Only 4 Input Lines

**Input Levels Compatible With
Integrated Logic Circuits**

**Operates From One Simple
Power Supply**

The Series NQ Digital Display employs numeric characters consisting of seven properly shaped segments. Each digit is formed by illuminating the correct segments. The digits are completely in plane and close to the surface of the display permitting wide viewing angles. The display is available with decimal points, plus-minus signs and colon.

The type NQZR and NQZG Decoder-Driver-Lamp Assemblies translate 8421 binary coded decimal signals into the proper segment illumination. These units require only one wire from each binary input for a total of four input lines. The two decoders are identical except that the NQZG unit decodes BCD 1010 as well as BCD 0000 as zero. The NQZR unit decodes only BCD 0000 as zero. (See Table 1.) Also, a decimal point driver is available with the NQZR unit, but cannot be provided on the NQZG unit.

The decoder-drivers have a "logical one" level of 3 volts and low signal current requirements. This allows them to be driven directly from integrated circuits as well as standard logic. The units may be obtained to

operate from either positive or negative logic levels. They feature reliable solid-state construction and diode coupled inputs. The positive logic level decoder-drivers use all silicon semiconductors.

High brightness neon lamps are driven by the decoder-drivers to provide the segment illumination. The lamps are aged and selected for reliable performance and long life.

The Decoder-Driver-Lamp Assemblies operate from line voltage using a full wave (4 diode bridge) rectifier. No filtering or regulation is necessary. However, the use of an isolation (1:1) transformer is generally required. Operation on half-wave rectified voltage reduces display brightness by 50%, providing a convenient dimming method.

The display is factory assembled as a single unit and may contain as many characters as desired. A printed circuit connector is used for electrical connections to each Decoder-Driver-Lamp Assembly. Holes are provided for soldering wires directly to the printed circuit if the use of a printed circuit connector is not desired.

SPECIFICATIONS

CHARACTERS

Numerical, Colon, Plus-Minus Sign. Decimal Point
integral with Numerical and Plus-Minus Sign.

NUMERAL HEIGHT

1 inch

CHARACTERS PER DISPLAY

Any number

DISPLAY COLOR

Amber

LAMP LIFE

60,000 hours

CODES

8421 (See Table 1)

For other codes write factory.

POWER REQUIREMENTS

(DISPLAY AND DECODER-DRIVERS)

105-125 v rms, full wave rectified, unfiltered,
22 ma rms nominal per decade.

Pos. supply for pos. logic levels.

Neg. supply for neg. logic levels.

(Brightness may be reduced to one-half with increased lamp life by using half-wave rectified supply.)

DECODER-DRIVER INPUT VOLTAGES

POSITIVE LOGIC Logical Zero: 0v to 0.7v
 Logical One: 3v to 40v or open

NEGATIVE LOGIC Logical Zero: 0v to -0.5v
Logical One: -3v to -20v or open

DECODER-DRIVER INPUT CURRENTS

All values max. peak @ 25 °C. (Currents vary between zero and peak with power supply voltage. See power requirements.)

LOGICAL ZERO		(Pos. and Neg. Logic)
	NQZR	NQZG
1	1.8 ma.	1.8 ma
2	3.4 ma	3.4 ma
4	1.8 ma	1.8 ma
8	1.8 ma	3.4 ma
Dec. Pt. & Plus-Minus Sign:		0.9 ma
LOGICAL ONE		(leakage current)
Pos. Logic		0.1 μ a
Neg. Logic		25 μ a

TEMPERATURE RANGE

Pos. Logic -20°C. to $+70^{\circ}\text{C.}$ Neg. Logic -20°C to $+50^{\circ}\text{C}$

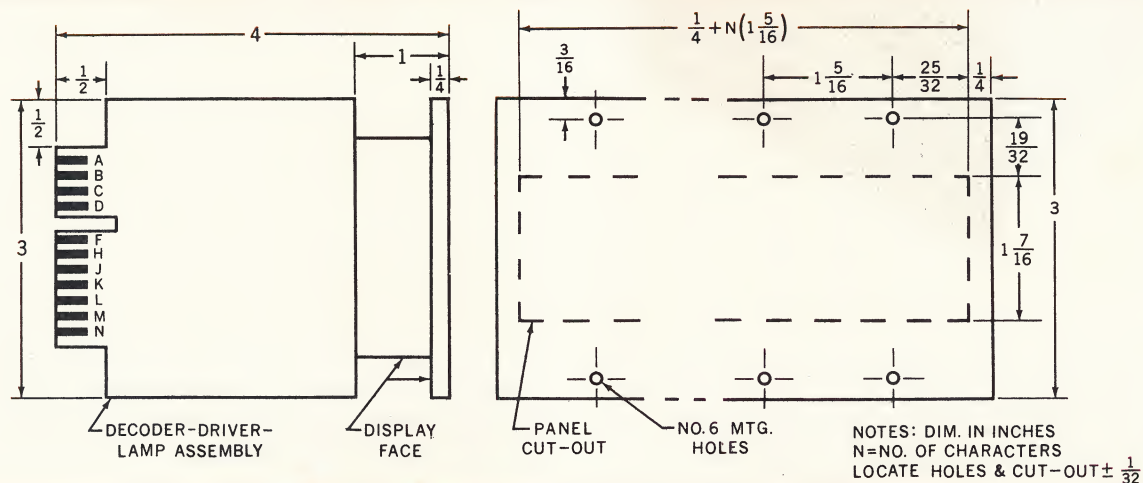


FIG. 1. SIDE AND FRONT VIEWS OF DISPLAY

DECIMAL NUMBER	BINARY INPUTS	
	NQZR 8421	NQZG 8421
0	0000	0000
1	0001	0001
2	0010	0010
3	0011	0011
4	0100	0100
5	0101	0101
6	0110	0110
7	0111	0111
8	1000	1000
9	1001	1001
0	—	1010

TABLE 1. BINARY CODES AND DECIMAL EQUIVALENTS

TERMINAL	NQZR	NQZG
A	1	1
B	Dec. Pt.	—
C	2	2
D	4	4
E	Key	Key
F	Pwr. Sply.	Pwr. Sply.
M	Ground	Ground
N	8	8

TABLE 2. TERMINAL CONNECTIONS

MB Associates

SERIES NQ **DIGITAL DISPLAY and DECODER-DRIVER**



**Fail Safe or Standard Lamp
Operation**

**Bright Easy-To-Read Numerals
Completely In Plane**

Rugged Long-Life Neon Lamps

One Simple Power Supply

Accepts Standard Logic Levels

Low Input Currents

Optional Integral Decimal Points

Simple Mounting

The Series NQ Digital Display employs numeric characters consisting of seven properly shaped segments. Each digit is formed by illuminating the correct segments. The illumination is provided by high brightness neon lamps which are aged and selected for reliable performance and long life. The digits are completely in plane and close to the surface of the display permitting wide viewing angles. The display is available with decimal points, plus-minus signs and colon.

Series NQ Decoder-Driver-Lamp Assemblies translate BCD logic levels into the proper segment illumination. The decoder-drivers may be obtained to operate from either positive or negative logic levels. They feature reliable solid-state construction and low drive current requirements. All inputs are diode coupled to operate directly from standard logic circuits. The positive logic level decoder-drivers use all silicon semiconductors.

The type NQZFS Decoder-Driver-Lamp Assembly provides a unique lamp fail safe feature which prevents false digits from being displayed in the event of one or more lamp failures. The NQZFS assembly includes circuitry which causes the bottom and lower right segments to turn off if a lamp fails in any of the other segments. Without these two segments lit it is impossible for the segments remaining lit to be interpreted

as a normal digit. Failures in the bottom and lower right segments themselves cannot cause false digits to be displayed.

The fail safe feature is illustrated in Fig. 2. Certain lamp failures cause the digits 6 and 8 to appear as 5 and 3 respectively without fail safe operation. At the right of Fig. 2 are the characters as they appear with fail safe operation. It is impossible for the segments remaining lit to be interpreted as normal digits.

The type NQZK Decoder-Driver-Lamp Assembly has the same specifications as the NQZFS unit except that the fail safe feature is not included.

The Decoder-Driver-Lamp Assemblies operate from line voltage using a full wave (4 diode bridge) rectifier. No filtering or regulation is necessary. However, the use of an isolation (1:1) transformer is generally required. Operation on half-wave rectified voltage reduces display brightness by 50%, providing a convenient dimming method.

The display is factory assembled as a single unit and may contain as many characters as desired. A printed circuit connector is used for electrical connections to the Decoder-Driver-Lamp Assembly. Holes are provided for soldering wires directly to the printed circuit if the use of a printed circuit connector is not desired.

SPECIFICATIONS

CHARACTERS

Numeral, Colon, Plus-Minus Sign, Decimal Point
integral with Numeral and Plus-Minus Sign.

NUMERAL HEIGHT

1 inch

CHARACTERS PER DISPLAY

Any number

DISPLAY COLOR

Amber

LAMP LIFE

60,000 hours

CODES

8421 (See Table 1)

For other codes write factory.

FAIL SAFE LAMP OPERATION

Provided on NQZFS numeric decoder-driver

DECODER-DRIVER INPUT VOLTAGES

POSITIVE LOGIC Logical Zero 0v to 0.7v

Logical One 5.4v to 25v

NEGATIVE LOGIC Logical Zero 0v to -0.5v

Logical One -5.4v to -20v

DECODER-DRIVER INPUT CURRENTS

All values max. peak @ 25°C. (Currents vary between zero and peak with power supply voltage. See power requirements.)

LOGICAL ZERO (Pos. and Neg. Logic)

Numeric decoder-driver: 4.0 ma

Dec. Pt. & Plus-Minus Sign: 0.9 ma

LOGICAL ONE (leakage current)

Pos. Logic Neg. Logic

0.1 μ a 25 μ a

POWER REQUIREMENTS

(DISPLAY AND DECODER-DRIVERS)

105-125 v rms, full wave rectified, unfiltered,
28 ma nominal per decade.

Pos. supply for pos. logic levels.

Neg. supply for neg. logic levels.

(Brightness may be reduced to one-half with increased lamp life by using half-wave rectified supply.)

TEMPERATURE RANGE

Pos. Logic 0-65° C.

Neg. Logic 0-50° C.

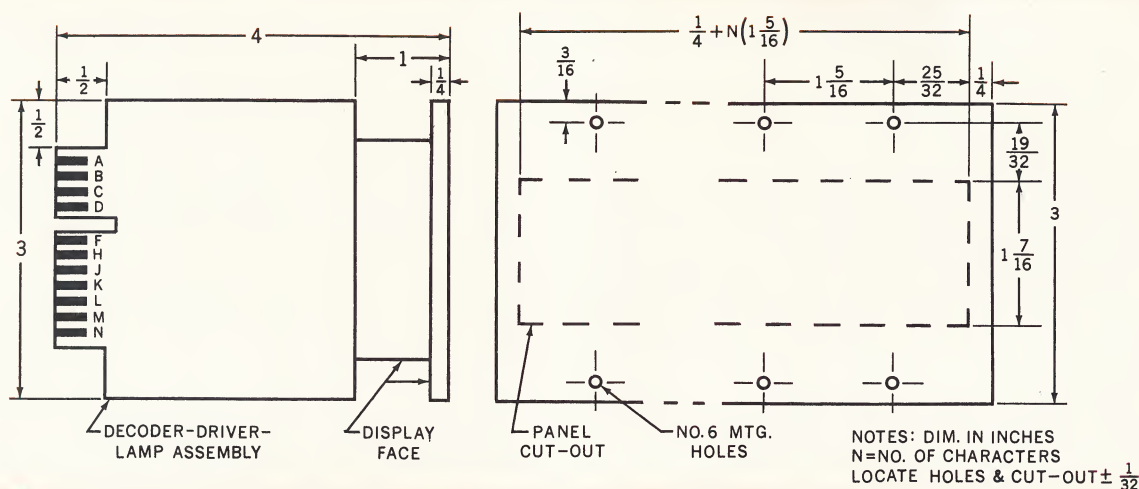


FIG. 1. SIDE AND FRONT VIEWS OF DISPLAY

DECIMAL NUMBER	BINARY INPUT 8421	TERMINAL CONNECTIONS
0	0000	A 2
1	0001	B 4
2	0010	C 1
3	0011	D 1
4	0100	E Key
5	0101	F Pwr. Sply.
6	0110	H Blank
7	0111	J 8
8	1000	K 2
9	1001	L 4
		M Ground
		N Dec. Pt.

TABLE 1. BINARY CODE AND TERMINAL CONNECTIONS



FIG. 2. ILLUSTRATION OF FAIL SAFE LAMP OPERATION

Specifications subject to change without notice.

SERIES NQ ORDERING INFORMATION

A complete display consists of a Display Face and one Decoder-Driver-Lamp Assembly per character.

A. DISPLAY FACE

The display face mounts on the equipment panel and directs the light from the lamp assemblies to form the characters. The order number for a display face has the following form:

NQFXX---X

Each X following the F denotes either a plus-minus sign (L), a colon (C) or the number of successive numeric characters. Each character in the display with the exception of the colon is followed by a decimal point. If a display without a plus-minus sign is desired and it is required to have a decimal point preceding the digit at the extreme left, an extra numeric character at the left must be ordered. The decimal point portion of this first character is then used.

EXAMPLES:

Five Numeric Characters

NQF5

Four Numeric Characters with a decimal point at the extreme left

NQF5

Five Numeric Characters preceded by a Plus-Minus Sign

NQFL5

Three Numeric Characters followed by a Colon followed by two
Numeric Characters

NQF3C2

B. DECODER-DRIVER-LAMP ASSEMBLY

The order number for a decoder-driver-lamp assembly has the following form:

NQ Z X X X

FS, K, G and R designate numeric decoder-driver-lamp assemblies.
See Bulletins NQ-1D and NQ-2D for specifications.

L designates plus-minus driver-lamp assembly.

C designates colon lamp assembly.

P designates positive logic levels.

N designates negative logic levels.

D if decimal point follows the character.

E if no decimal point follows the character.

The order number for a driver-lamp assembly for a separate
decimal point with no character preceding it

for positive logic levels.

NQZPD

for negative logic levels.

NQZND

EXAMPLES:

An **NQZFS** Numeric Decoder-Driver-Lamp Assembly
with decimal point driver for negative logic levels.

NQZFSND

An **NQZR** Numeric Decoder-Driver-Lamp Assembly
without decimal point driver for positive logic levels.

NQZRPE

A Plus-Minus Driver-Lamp Assembly without decimal point
driver for positive logic levels.

NQZLPE

C. ACCESSORIES

Printed circuit connector for Decoder-Driver-Lamp Assembly:
Cinch-Jones Type 50-12A-20.

NQ CONNECTOR

SERIES NQ PRICE LIST

A. DISPLAY FACE

Prices are based on the total number of characters (numeric, plus-minus sign or colon) ordered and not on the number of display faces.

<u>No. of Characters</u>	<u>Price Per Character</u>
1-3	\$10.
4-24	8.
25 and over	6.

B. DECODER-DRIVER-LAMP ASSEMBLIES

The following prices are for numeric decoder-driver-lamp assemblies.

<u>No. of Assemblies</u>	<u>NQZK</u>	<u>NQZR</u>	<u>NQZG and NQZFS</u>
1-3	\$48.	\$56.	\$63.
4-24	39.	45.	51.
25 and over	33.	38.	43.

For decimal point driver add \$4. Decimal point not available with NQZG unit.

Type of Assembly

Plus-Minus Sign without Decimal-Point	\$16 any quantity
Plus-Minus Sign with Decimal Point	20 " "
Separate Decimal Point	11 " "
Colon	11 " "

C. ACCESSORIES

Printed circuit connector	\$1.70 any quantity
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Prices subject to change without notice.

Minimum Order:

\$10.

Terms:

1% 10 days, net 30 days, F.O.B. Philadelphia, Pa.

Delivery:

2 to 4 weeks.

Warranty:

All MBA components are warranted to be free from defects caused by materials or workmanship for a period of 90 days from date of shipment. Factory authorization must be obtained before returning defective units.

Repair Service:

Charges available upon request.

MB Associates

P.O. Box 4994, Philadelphia 19, Pa. (215) Vltor 3-8810